Space Weather Forecast

Issued on Wednesday, 22 March 2023 at 12:22 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate class flares. G1-G2 Minor/Moderate storms likely, mainly day 2 (23rd).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low with only common class flares, the strongest of which was from one of the larger sunspots in the southeast disc. There are six sunspot regions on the Earth-facing disc, five of which are numbered. Four of the regions, including the spot group mentioned above, are located in the southeast quadrant. Remaining regions are relatively small and simple.

There are a number of filaments on the Earth-facing disc, which are lines of material held together by the Suns magnetic field. These have been the source of a few coronal mass ejections (CMEs) in the last few days as the Sun's magnetic field changes and ejects this material. However, these have generally been off the Earth-Sun line with no Earth-directed CMEs observed in the last 24 hours. Confidence is Low, however, as the availability of imagery for analysis is currently limited.

Solar Wind / Geomagnetic Activity: The solar wind speed showed the likely influence of the fast winds from a coronal hole, rising from slightly elevate to elevated levels through the period. The total magnetic field strength was weak to moderate and on a slow declining trend, with the north-south component weakly variable. Geomagnetic activity was Quiet to Active (Kp 1-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is now close to background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low Solar activity is expected, with a chance of isolated Moderate flares. The main flare risk is currently from the more complex region in the southeast disc or from any of the regions rotating onto the disc form the far-side.

Solar Wind / Geomagnetic Activity: The CME from the southwest disc on the 20 March has a low chance of glancing Earth early on day 2 (23rd). A second CME a filament lifting from the northeast of the disc on the 20 March may also give a glancing arrival around midday on day 2. Otherwise current elevated winds from the recent coronal hole sourced enhancement are expected to ease slightly day 1 (22nd) before a transition into a stronger fast wind region occurs day 2 (23rd). These elevated winds are expected to continue day 3 (24th), perhaps easing day 4 (25th).

Geomagnetic activity is expected to be Quiet with Unsettled intervals for much of day 1 (22nd). During day 2 (23rd), the combined effect of CME arrivals and CH86/- enhancement is expected to increase activity to Unsettled to Active, with G1/Minor Storm intervals likely. There is a slight

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chance of G2/Moderate storms, should these CME and coronal hole sources enhancements align. Any enhanced activity is likely to continue day 3 (24th), but gradually easing back to mainly Quiet to Unsettled intervals by day 4 (25th).

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue close to background, with only a very slight chance of further enhancements should any significant flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	70	40	5
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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